STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF APPROVING A NONRADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION APPLICATION FOR THE ENVIRONMENTAL MOLECULAR SCIENCE LABORATORY, DEPARTMENT OF ENERGY-RICHLAND	))))))	NOC APPROVAL ORDER **NUMBER: DE03NWP-002**

To: Mr. Joel Hebdon, Director
Regulatory Compliance and Analysis Division
United States Department of Energy
Richland Operations Office
P.O. Box 550, MSIN: A2-15
Richland, Washington 99352

FINDINGS:

In April 2002, the United States Department of Energy, Richland (DOE-RL), submitted a Notice of Construction (NOC) application for the Environmental Molecular Science Laboratory (EMSL) for increased air emissions. The increases were requested for increased potential operation of an existing emergency diesel electric generator, for construction and operation of an additional emergency diesel electric generator, for increased potential emergency and sever winter operation of existing dual-fuel boilers on diesel as well as natural gas, and to distinguish emission limits and conditions applicable to R&D operations from those due to the operation of building boilers and emergency electric generators

In addition, this revision of the original permit, NOC-94-08 issued by Ecology in September 1994, consolidates earlier revisions approved by Ecology in the interim since the original NOC. This revision also excludes conditions that have been met by the permittee. A brief summary of these permit revisions and conditions follows:

- In January 1999 Ecology approved revisions to Approval Condition No. 1 establishing emission limits for toxic and criteria air pollutants from R&D sources, and approving the use of inventory, release fractions and modeling to demonstrate compliance.
- In June 2000 Ecology approved revisions to Approval Condition No. 1,2 and 4 to use ISCST3 for dispersion modeling, to modify the requirements for boiler operation to good combustion practices, and to clarify the application of the general requirement for operating and maintenance manuals to R&D operations.
- Conditions of the original Approval Order that have been met, and therefore excluded from this order, include conditions requiring commencement of construction within 18 months of construction approval, notification before startup, initial source emissions testing and reporting, and the submission of normal and maximum emissions of toxic air pollutant releases within 15 months of startup.

In relation to the above, the Department of Ecology, (Ecology) State of Washington, pursuant to RCW 70.94.152, WAC 173-400, and WAC 173-460 makes the following determinations:

1. The facility, if operated as herein required, will be in accordance with applicable rules and regulations, as set forth in Chapter 173-400 WAC and 173-460 WAC, and the operation thereof will not result in ambient air quality standards being exceeded.

2. The proposed project, if constructed and operated as herein required, will provide all known, available, and reasonable methods of emission control.

A. LAWS AND REGULATIONS

All proposed activities conducted within the EMSL stationary source by DOE-RL, referred herein to as the permittee, shall comply with all requirements as specified in:

- RCW Chapter 70.94, Washington Clean Air Act
- WAC Chapter 173-400, General Regulations for Air Pollution Sources
- WAC Chapter 173-460, Controls for New Sources of Toxic Air Pollutants

B. EMISSIONS

Operations at the EMSL will generate the following estimated emissions of criteria pollutants in the event of an extreme heating year that also required the maximum assumed potential use of emergency back up diesel fuel for boiler heating in the event of the loss of gas supplies, and the maximum assumed potential use of emergency backup diesel electric power.

TOTAL EMSL EMISSIONS – EXTREME WEATHER YEAR, TONS/YR*							
	NO_x (as NO_2))	CO	SO_x (as SO_2)	Total HC	Particulate	PM_{10}	Lead
Existing Diesel	2.94	0.66	0.065	0.11	0.11	0.089	No data
New Diesel	2.85	3.51	0.065	0.41	0.16	0.14	No data
Gas Boilers-Extreme Year	1.79	2.14	0.046	0.23	0.15	0.0015	6.9×10^{-6}
Boilers & Generators Total	7.58	6.31	0.176	0.75	0.42	0.2305	6.9×10^{-6}
R&D Operations	2	5	2	2	1.25	0.75	0.005
Potential Facility Total	9.58	11.31	2.18	2.75	1.67	0.98	0.005

EMSL will generate the following estimated emissions of criteria pollutants in a normal heating year, with normal testing and preventative maintenance operation of the diesel electric generators and the boilers on backup diesel fuel, and typical research operations.

TOTAL EMSL EMISSIONS – NORMAL WEATHER YEAR, TONS/YR*							
	NOx (as NO2))	CO	SOx (as SO2)	Total HC	Particulate	PM10	Lead
Existing Diesel	0.15	0.03	0.003	0.006	0.006	0.005	No data
New Diesel	0.14	0.18	0.003	0.02	0.008	0.007	No data
Gas Boilers- Normal Year	1.47	1.81	0.018	0.19	0.12	0.001	5.9×10^{-6}
Boilers & Generators Total	1.76	2.02	0.024	0.216	0.134	0.013	5.90E-06
2002 R&D Operations	<0.003	<0.04	<0.001	<0.5	$<3 \times 10^{-6}$	$<3 \times 10^{-6}$	$<1 \times 10^{-8}$
Facility Total	1.76	2.06	0.025	0.716	0.134	0.013	5.9×10^{-6}

Toxic air pollutant emissions estimates for the boilers and generators for an extreme winter are shown in the table below. These estimates are based on a winter requiring operation of both emergency diesel electric generators for 316 hours each, and emergency operation of the three boilers on diesel for 248 full capacity boiler hours.

EMSL Boiler & Generator Toxic Air Emissions in and Extreme Weather Year							
		Annual SQERs			Hourly SQERs		
Pollutant	**CAS #**	**Grand Total**	**SQER**	**Percent of SQER**	**Grand Total**	**SQER**	**Percent of SQER**
		lbs/yr	**lbs/yr**		**lbs/hr**	**lbs/hr**	
1,1,1-Trichloethane	71-55-6	2.1E-03	4.4E+04	0%	2.5E-05	5.0E+00	0%
1,3-Butadiene	106-99-0	2.0E-01	5.0E-01	40%	6.3E-04	N/A	N/A
Acetaldehyde	75-07-0	1.3E-01	5.0E+01	0%	4.1E-04	N/A	N/A
Acrolein	107-02-8	4.0E-02	1.8E+02	0%	1.3E-04	2.0E-02	1%
Barium	7440-39-3	1.2E-01	1.8E+02	0%	6.5E-05	2.0E-02	0%
Benzene	71-43-2	4.0E+00	2.0E+01	20%	1.3E-02	N/A	N/A
Cobalt	7440-48-4	2.3E-03	1.8E+02	0%	1.2E-06	2.0E-02	0%
Copper	7440-50-8	3.1E-02	1.8E+02	0%	1.0E-04	2.0E-02	1%
Ethyl benzene	100-41-4	5.6E-04	4.4E+04	0%	6.8E-06	5.0E+00	0%
Formaldehyde	50-00-0	2.8E+00	2.0E+01	14%	5.9E-03	N/A	N/A
Lead	7439-92-1	2.5E-02	1.8E+02	0%	1.4E-04	2.6E+00	0%
Manganese	7439-96-5	1.8E-02	1.8E+02	0%	5.6E-06	2.0E-02	0%
Mercury	7439-97-6	2.5E+00	1.8E+02	1%	8.0E-03	2.0E-01	4%
Molybdenum	7439-98-7	3.1E-02	1.8E+03	0%	1.6E-05	2.0E-01	0%
Naphthalene	91-20-3	6.9E-01	2.3E+04	0%	2.2E-03	2.6E+00	0%

n-Butane	106-97-8	5.8E+01	4.4E+04	0%	3.1E-02	5.0E+00	1%
n-Hexane	110-54-3	5.0E+01	2.3E+04	0%	2.7E-02	2.6E+00	1%
n-Pentane	109-66-0	7.2E+01	4.4E+04	0%	3.8E-02	5.0E+00	1%
o-Xylene	1330-20-7	9.8E-01	4.4E+04	0%	3.1E-03	5.0E+00	0%
Selenium	7782-49-2	1.9E-02	1.8E+02	0%	2.3E-04	2.0E-02	1%
Toluene	108-88-3	1.6E+00	4.4E+04	0%	5.2E-03	5.0E+00	0%
Zinc (as zinc chromate)	7440-66-6	8.1E-01	1.8E+02	0%		N/A	N/A
Comparison to ASILS							
Pollutant	**CAS #**	**Total lbs/yr**	**Total ug/m^3**	**ASIL ug/m^3**	**Percent of ASIL**		
Arsenic	7440-38-2	1.1E-02	1.7E-06	2.3E-04	1%		
Beryllium	7440-41-7	4.1E-03	6.7E-07	4.2E-04	0%		
Cadmium	7440-43-9	3.4E-02	5.6E-06	5.6E-04	1%		
Chromium	7440-47-3	4.3E-02	7.0E-06	8.3E-05	8%		
Nickel	7440-66-6	6.2E-02	1.0E-05	2.1E-03	0%		
PAHs		1.1E+00	8.1E-05	4.8E-04	17%		

All emissions in the extreme case are well below the applicable small quantity emission rates (SQER), or the ASIL for those compounds that do not have an SQER.

During a normal year it is estimated that none of the emissions would be more than a 12% of a SQER or 1% of an ASIL, as emergency mode operations would include only testing of the generators and boilers on diesel fuel for 16 hours each, and gas consumption would be about 15% less than during an extreme year.

The toxics emissions above do not include those from R&D operations which can vary monthly and yearly depending on the R&D projects being conducted, but are typically small. In 2002 none was more than few percent of its ASIL.

C. BACT and T-BACT

A BACT and T-BACT analysis was conducted and originally submitted in June 1994 with the Notice of Construction Application. This revision does not include either a BACT or T-BACT analysis due to the scale of the modification and the use of the new equipment for emergency episodes only, except for testing. BACT and T-BACT are summarized for these units below.

BACT **--** WAC 173-400-113 requires the use of Best Available Control Technology (BACT) to control emissions. Best available control technology (BACT) for the new diesel electric generator would consist of meeting the performance certification requirements of 40 CFR 89, using fuel with a sulfur content of 0.05% or less, and good operating practices. Best available Control Technology for the boilers running on diesel is the use of low sulfur fuel (< 0.05%) and Good Combustion Practices (GCP).

T-BACT -- WAC 173-460-040(4)(b) requires the use of Best Available Control Technology for Toxics (T-BACT) to control toxic emissions. A T-BACT analysis was done, the results indicated the emissions would best be limited by inventory control as specified in the approval conditions. All emissions resulting from the proposed

operations are in compliance with the WAC 173-460 acceptable source impact levels (ASILs) in any area which does not have restricted or controlled public access.

ADDITIONAL FINDINGS

1. PROCESS DESCRIPTION

EMSL is a national scientific user facility, and a research facility, the a mission to:

- Provide advanced resources to scientists engaged in fundamental research on the physical, chemical and biological processes that underpin critical scientific issues.
- Conduct fundamental research in molecular and computational sciences to achieve a better understanding of biological and environmental effects associated with energy technologies; to provide a basis for new and improved energy technologies; and in support of DOE's other missions.
- Educate scientists in the molecular and computational sciences to meet the demanding challenges of the future.

The modification and consolidation that is the subject of this approval order does not include changes to the basic processes described in the original notice of construction application and permitted in the original NOC approval.

This application requests approval to increase the currently permitted emission limits to allow:

- increased operation of the existing diesel-electric generator
- increased operation of the existing hot water boilers, and
- the construction and operation of an additional stationary diesel-electric generator

The modification is requested to provide reliable and compliant operations during potential losses of primary supplies of electricity or natural gas, and during an extreme winter requiring higher than normal gas usage. The impact on public and private investments in research equipment and projects could be substantial if essential facility energy demands are not met.

THEREFORE, IT IS ORDERED that the project as described in said Notice of Construction application, and more specifically detailed in plans, specifications, and other information, submitted to the Department of Ecology in reference thereto, is approved for construction, installation and operation, provided the following conditions are met:

APPROVAL CONDITIONS:

1. **TOTAL EMISSION LIMITS**

A. For Toxic Air Emissions, the emission limit for each TAP is the emission rate that equates to the Acceptable Source Impact Level (ASIL), using ISCST3, in any area which does not have restricted or controlled public access. The nearest such points are Horn Rapids Road to the North, Stevens Drive to the West, George Washington Way to the East, Battelle Avenue to the South, and the User Housing Facility. Atmospheric data used in the ISCST3 model shall be actual or worst-case data, collected and used based on EPA guidance.

B. For criteria pollutants, the emission limits shall not exceed the levels specified below:

Emissions of criteria pollutants shall be less than the following rates (tons/year), except as noted in Section 2. paragraph C. below:

	Boiler and Generator Operations	R&D Operations	EMSL Total
	Tons/year		
NOx	7.6	2	9.6
CO	6.3	5	11.3
SOx	0.18	2	2.18
Total HC	0.75	2	2.75
Particulate	0.42	1.25	1.67
PM_{10}	0.23	0.75	0.98
Lead	0.005	0.005	0.01

C. A Notice of Construction (NOC) application for a modification will be required if total emissions are shown to exceed the emission limits specified in A. or B. above, except as noted in Section 2. paragraph C

2. **EMISSION CONTROLS, MONITORING, AND RECORDKEEPING**

A. Emissions from Research and Development: Environmental Molecular Sciences Laboratory (EMSL) research operations may be conducted, and additions and changes made to accommodate changes in research operations. These changes can be made without filing a Notice of Construction (NOC), provided the emissions from research operations, additions and changes meet the acceptable source impact levels (ASILs) and the Washington Administrative Code (WAC) 173-400-110 new source review (NSR) thresholds. Emissions from research operations, additions and changes will be the sum of all emissions sources in the EMSL building, excluding those ~~not~~ otherwise exempt under

WAC 173-400 or WAC 173-460, and excluding those due the building support boilers and generator addressed in Condition C of this order.

A new NOC will be required if building R&D emissions of toxic air pollutants exceed the Small Quantity Emission Rates, unless a T-Screen or ISCST3 analysis, using the current model versions, is run that shows the emissions would result in concentrations less than the ASILs, or if building R&D emissions of criteria pollutants would exceed the WAC 173-400-110 thresholds. Results of these analyses will be maintained on file at Pacific Northwest National Laboratory for inspection.

Emissions from the use of the chemical inventory in the building will be determined as summarized in *Methodology for Calculating Air Emissions from R&D in the Environmental Molecular Sciences Laboratory EMSL* (PNNL unpublished method, dated 4/21/2003) and may be modified with Ecology's concurrence.

B. EMSL personnel shall keep volatile chemicals covered at all times when practical, on weekends, and during evenings hours, or other times when the lab module is not being otherwise used.

C. Emissions from Building Boilers and Generators:
The following emission units:
- Three operating or standby 5 MMBTU/hr gas-fired hot water boilers utilizing natural gas
- The above boilers and two backup diesel electric generators (1072 HP and 1186HP) using diesel fuel

may be operated using good combustion practices (GCP) as described below.

The EMSL gas-fired boilers shall be operated in accordance with good combustion practices to minimize emissions based on the manufacturer's recommendations. Periodic preventive maintenance and combustion adjustments shall be made as necessary to maintain GCP, but at least annually. Per Ecology's request, Energy shall demonstrate the effectiveness of GCP to Ecology during normal operation of the boilers.

The EMSL boilers may be operated on diesel fuel for routine maintenance and testing and to maintain building operations when gas supplies are interrupted. The diesel-electric generators may be operated during electrical utility service failures and power curtailments, and for routine maintenance and testing.

Compliance with the limits in Approval Condition 1.B. will be deemed achieved by:

- Limiting the total diesel fuel consumption by all three boilers combined to 11,160 gallons/year. In the event primary gas supplies are interrupted for more than the assumed 200 full capacity-hours/year, boilers may be operated as necessary to maintain essential building operations, upon notification to Ecology, irrespective of the above emission limits.

- Limiting natural gas consumption by all boilers combined to 283,000 therms per year
- Limiting the total fuel consumed by both diesel generators to 36,900 gallons/year. In the event primary electrical supplies are interrupted for more than the assumed 300 hours/year/generator, generators may be operated as necessary to maintain essential building operations, upon notification to Ecology, irrespective of the above emission limits.
- Operating the boilers and the diesel electric generators in accordance with good combustion practices to minimize emissions based on the manufactures' recommendations, and by using diesel fuel with a sulfur content of 0.05% or less.

The following records shall be maintained and presented to Ecology upon request:

- Annual (calendar year) natural gas and diesel fuel consumption by boilers
- Annual (calendar year) diesel fuel consumption by generators
- Records demonstrating operation to good combustion practices
- Records documenting use of diesel with a sulfur content of 0.05% or less.

This condition is required to implement the Washington State Implementation Plan, and is therefore federally enforceable.

D. Opacity from the five chemical stacks shall not exceed 10 percent as measured by Washington State Source Test Method 9B. Opacity from the sixth stack with HEPA filters air emission control shall not exceed 5 percent. Opacity from stacks for three boilers shall not exceed 5 percent.

E. Operation and Maintenance (O&M) manuals are required for emission units that if not properly operated or maintained could cause the emission limits of this permit to be exceeded. Manufactures' instructions may be referenced. O&M manuals shall be updated to reflect modifications to emission units, or the operation of emission units that could cause the emission limits of this permit to be exceeded. Emissions that result from failure to follow the requirements of the O&M manuals or manufactures instructions may be considered proof that the equipment was not properly operated, maintained and tested. Copies of the O&M manuals shall be available to Ecology.

F. Energy shall not make any changes in the designs of the proposed air emission control systems without first notifying Ecology. Ecology may require a new approval or a modification of this final approval.

3. INITIAL NOTIFICATIONS & SUBMITTALS

All notifications and submittals required under these Approval Conditions shall be sent to:

Washington State Department of Ecology
Nuclear Waste Program
1315 West Fourth Avenue

Kennewick, Washington 99336-6018

GENERAL CONDITIONS

A. **Visible Emissions**: No visible emissions shall be allowed beyond the property line.

B. **Compliance Assurance Access**: Access to the source by EPA or Ecology shall be allowed for the purposes of compliance assurance inspections. Failure to allow access is grounds for revocation of the Order approving the NOC.

C. **Modification to Facility or Operating Procedures**: Any modification to any equipment or operating procedures, contrary to information in the NOC application, shall be reported to Ecology at least sixty (60) days before such modification. Such modification may require a new, or amended, NOC approval Order.

D. **Emissions detrimental to persons or property.** No person shall cause or permit the emission of any air contaminant from any source if it is detrimental to the health, safety, or welfare of any person, or causes damage to property or business.

E. **Activities Inconsistent with this Order**: Any activity undertaken by the Permittee or others, in a manner that is inconsistent with the NOC application, and this determination, shall be subject to Ecology enforcement under applicable regulations.

F. **Obligations under Other Laws or Regulations**: Nothing in this Order shall be construed to relieve the Permittee of its obligations under any local, state, or federal laws, or regulations.

G. Nothing in this approval shall be construed as obviating compliance with any requirement of law other than those imposed pursuant to the Washington Clean Air Act, and rules and regulations thereunder.

H. Any violation of such rules and regulations, or of the terms of this approval, shall be subject to the sanctions provided in Chapter 70.94 RCW.

Authorization may be modified, suspended or revoked in whole, or part, for cause including, but not limited to, the following:

1. Violation of any terms or conditions of this authorization;

2. Obtaining this authorization by misrepresentation, or failure to disclose fully all relevant facts.

The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of this authorization to any circumstance, is held invalid, the application of such provision to their circumstances, and the remainder of this authorization, shall not be affected thereby.

Any person feeling aggrieved by this ORDER may obtain review thereof by application, within thirty (30) days of receipt of this ORDER, to:

Pollution Control Hearings Board
P.O. Box 40903
Olympia, Washington 98504-0903

Concurrently, copies of the application must be sent to:

Washington State Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Washington State Department of Ecology
1315 West Fourth Avenue
Kennewick Washington 99336-6018

These procedures are consistent with the provisions of Chapter 43.21B RCW, and the rules and regulations adopted thereunder.

DATED at Kennewick, Washington, this xxx.

PREPARED AND REVIEWED BY:

APPROVED BY:
